

Tenth Contribution to the Herpetology of Tropical America.

BY E. D. COPE.

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The greater number of the species described in this paper were sent to the Smithsonian Institution by its correspondents, and submitted to my examination by its Secretary, Professor Henry.

BUFO MELANOCHLORUS Cope

B. valliceps var. Cope, Journ. Academy, Phila., 1865, p. 100.

Orbital borders elevated, and with parietal branch crests, which are prolonged; toes long, nearly free; end of carpus reaching end of muzzle; paratoids large; a lateral dormal fold; tympanum large; green with deep black spots; throat and thorax black.

This toad differs very much in appearance from the *Bufo valliceps*, but is nearly allied in essentials, its other affinities are to the *B. auritus*. The fingers are quite long, but the posterior legs are short, the heel reaching the posterior border of the orbit. The parietal crest is long; the supratympanic is well developed, and preorbital very weak. The front is not narrower, nor does the muzzle project beyond the mouth. The diameter of the very distinct round tympanic disc is half that of the orbit, which is large. The tongue is long and narrow, and the ostia are only half as large as the rather large choanæ. The parotoids are quite small, sub-triangular and directed outwards and backwards. The skin is nearly smooth above, except on the scapular and iliac regions, and is minutely roughened below. There are two tarsal tubercles, and no tarsal fold. Length of head and body, .047; of head, .015; of hind leg, .070; of hind foot, .030.

The allied *Bufo coniferus* Cope differs from this species in its broadly palmate feet, etc.

East Costa Rica, W. M. Gabb.

BUFO CANALIFERUS Cope.

Orbital border reverted crest-like; a preorbital crest; tympanum distinct; head narrow, muzzle projecting; parotoids large, triangular, with scapular angle; rough; brown with dorsal and lateral light bands.

This handsome species is characterized by the narrow gutter-like front, and prominent muzzle, together with the very large, angulate parotoids. The orbital borders are strongly everted, but without parietal branches. The preorbital crest is not very strong, and the supratympanic is quite short. The muzzle is contracted, and overhangs the mouth. The diameter of the distinct *membrum tympani*, is half that of the orbit. The parotoid reaches to above the middle of the humerus, has a straight external, and convex internal outline, and is rather lateral in position. Its lateral truncation is similar to that seen in *B. hamatiticus*. The skin is tubercular everywhere, finely so below. The posterior limbs are of median length,

the heel reaching to the tympanum. Two rather small tarsal tubercles, no tarsal fold. Soles rough, the palmation measuring the middles of the shorter toes. The tongue is small and narrow; the ostia are a little smaller than the choanae.

Length of head and body, .054; of head, to posterior line of tympana, .013; width of head at do. .018; length of hind leg, .071; of hind foot, .033.

The color is a light or dark deer brown, with a light vertebral band (rarely absent). On each side of the latter are large brown spots with narrow pale borders. A dark band extends from the orbit to the middle of the side, and above it a broad pale band extends to the groin; inferior surfaces, uniform light yellow.

This species differs from the *B. argillaceus* in its strong cranial crests, projecting muzzle, and large paratoid glands; in the last two characters, and in the narrow front, from the *B. sternosignatus*.

West Tehuantepec, Sumichrast.

Hyla spilomma Cope.

Fingers free; vomerine teeth in transverse series behind line of posterior nares; skin thickened above; tympanum two-fifths eye; frontal bones osseous in front; eye spotted with yellow.

This species is remarkable for the ossification of the anterior portion of the fronto-parietal bones, which are in contact on the middle line near to the ethmoid bone. Posteriorly they are separated, leaving a fontanelle, which represents the posterior portion of the usual one. The species in this respect approximates the genus *Scytopsis*.

The head is broad, and the muzzle very short; the canthus are obsolete, and the nostrils a little nearer the end of the muzzle than the orbit. The tongue is wide and entire, and the choanae small. The palettes are nearly as large as the tympanic disc, and, the toes are quite short, and only about half webbed. The heel of the extended limb only reaches the posterior portion of the orbit.

The superior and lateral integument is thickened and studded on the back with rather large, obtuse, warts. The length of head and body is, .038; of head including tympana, .011; width of head at do., .014; length of hind leg, .052; of hind foot, .023.

The color in these specimens is a light purplish brown, without variations, excepting in one instance. In this one the darker dorsal region is separated from the sides by a broad blackish band which extends from above the tympanum to the groin on each side. The iris is colored in a manner which I do not find in any other species. The pupil appears cruciform, and the interspaces are golden, with a black spot in the outer margin.

This species belongs to the series without webs between the fingers. Among these it is distinguished by the posterior position of the vomerine teeth, moderate tympanum, etc.

From Cosamaloapan Vera Cruz, from Francis Sumichrast.

HYLA BISTINCTA Cope.

Fingers free; vomerine teeth between nares; foot shorter than tibia and femur; tympanum one-fifth diameter of eye; vomerine teeth in small fasciculi; frontal bones ossified in front; blue, sides pale varied; lip not white-bordered.

Size of *Hyla carolinensis*. The head, particularly the interorbital region, is broad and flat; the canthus is distinct; the *membranam tympani* is exceedingly small, and is overhung by a thick dermal fold. The skin of the superior surfaces is smooth. The fore-limbs are very stout, and the animal being a male in breeding condition, the thumb bears two corneous plates on the inner side. The larger of these is the inferior, and forms a strong prominence on the metacarpal. The surface is composed of densely packed points. The posterior limbs are long, the heel reaching nearly to the end of the muzzle. The feet are of moderate proportions, and not fully webbed; the membrane reaches the base of the penultimate phalange of the third and fourth digits, and farther on the fifth.

Length of head and body, .045; of head, .012, width of head at tympana, .015; length of hind leg, .067; of hind foot, .031.

Color, upper surfaces including femur and humerus, dark-bluish plumbeous, without marks; inferior surfaces yellow. Sides marbled with the two colors; posterior face of femur pale brown, with a few yellow specks along the superior border. Eye unspotted.

Vera Cruz most probably; obtained by Dr. Sumichrast with the *H. spilomma* and *H. miotympanum* Cope (= *H. microtis* Peters).

CHOROPHILUS VERRUCOSUS Cope.

The length of the head to the posterior margin of the *membranam tympani* enters the total length to the vent three and one-sixth times. The head itself is narrow and acuminate, the muzzle projecting acutely beyond the labial margin. The external nares mark two-fifths the distance from the end of the muzzle to the orbital border. The *membranam tympani* is only one-fourth the diameter of the orbit. The canthus rostralis is distinct, but obtusely rounded. The vomerine fasciculi are approximated, and near the line of the posterior border of the nares, which are larger than the minute *ostia pharyngea*. The tongue is large and wide behind and faintly emarginate.

The heel of the extended hind leg extends to between the orbit and nostril: the femur is short, while the tarsus is long, a little exceeding half the length of the tibia, and exceeding the length of the remainder of the foot, minus the longest toe. The skin of the gular and sternal region is smooth; of the abdomen, areolate. That of the dorsal region is tubercular, smooth warts of large and small size being irregularly crowded over its entire surface, and not at all resembling the areolate surface of the belly.

Color above leaden, with three longitudinal rows of darker, light edged spots, extending, one on each side, and one on the median line. They are each composed of a series of spots joined end to end. Femur and tibia

cross-barr'd. Upper lip dark plumbeous, with a series of five white spots; a similar spot below the tympanum. Inferior surfaces yellowish. •

Length of head and body.....	.019
“ “ head.....	.006
“ “ hind limb.....	.026
“ “ femur.....	.007
“ “ tibia.....	.008
“ “ tarsus.....	.005
Width of head at tympana.....	.0055

From Volusia, Florida; Mrs. A. D. Lungren.

This *Chorophilus* is similar in proportions to the *C. triseriatus*, but is well distinguished by the characters of the skin, and the coloration. The tubercular upper surface is quite peculiar, and the smooth gular region is equally wanting to the Northern frog. The dorsal skin is somewhat like that of *Acris gryllus*.

LITHODYTES LANCIFORMIS Cope.

Vomerine teeth in two fasciculi which are truncate posteriorly, and are situated behind the posterior line of the posterior nares. The supraorbital borders not thrown into ridges. Tympanum not narrowed. Heel reaching to extremity of muzzle, when the posterior leg is extended. The head is nearly twice as long as the pelvis.

The head and muzzle are flat, the latter narrowed and convex at the extremity. The canthus rostralis is well defined, and the nostril is nearly terminal. The bones are nearly plane and vertical, and their length to the end of the muzzle is twice the diameter of the eye. The latter is one-third greater than that of the tympanum. The choanæ exceed the ostia in size. There are no dermal folds on the back or inferior surface. The metatarsi are all somewhat separated, and connected by a thin membrane, but this is merely due to the attenuation of the usual solar integument. The hind legs are very long; the pallettes small on the hands, and of median size on the feet.

The color above is dark ashen penetrated with pink; there is a narrow median dorsal white line. A broad black band extends from the end of the muzzle across the tympanum, where it contracts to a narrow black line which extends from the superior border of the tympanum to near the middle of the side. The concealed surfaces of the limbs are uniformly dusky; the femur and tibia are pink with dusky cross-bands. There is a dark interorbital cross-band in front of which the muzzle is very pale. Upper lip without dark spots; below immaculate.

Total length M. .026; of head, .011, or 2.4 of the total. Hind limb, .050.

From the "West Coast of Central America," without more specific locality.

This species is easily distinguished by the great relative length of the head, especially as compared with that of the pelvis.

LITHODYTES PELVICULUS Cope.

Lateral borders of the fronto-parietal bones elevated into longitudinal crests, which on the vertex are abruptly incurved without meeting. Tympanic disc a broad vertical oval, as large as eye; vomerine teeth in short, approximated, transverse, fasciculi, behind the line of the posterior border of nares. Head short, very wide, muzzle not projecting. Heel of extended hind foot reaching to middle of orbit. Gray varied with blackish above and below.

This species resembles nearly the *L. megacephalus* Cope, Journ. Acad. Phila., 1875, p. 100, but differs in a number of points. The first is the much greater size of tympanic disc, whose diameter is only about half that of the orbit in the latter; in the posterior incurvature of the superciliary crests (they are straight in *L. megacephalus*); in the much smaller size, the linear dimensions being less than half those of the *L. megacephalus*.

There are two suprascapular longitudinal dermal folds which converge towards the middle line without meeting. Pallettes and tubercles small. Canthus rostralis straight, intercanthal region plane; muzzle a little retreating, nostrils terminal. General color ashen gray; a large black spot below eye, and another above, and on tympanum; muzzle, interorbital, and interscapular regions dusky. Soles and posterior faces of femora black. Concealed faces of hind feet and limbs and abdomen, yellow coarsely reticulated with blackish; throat thickly dusted with the same. A dark band with a pale superior border above each ilium.

The *L. pelvicolus* is said to have been found on the west coast of Central America, without more special designation of locality.

PHYLLOBATES CYSTIGNATHOIDES Cope.

This rather small species has the form of the species of *Lithodytes*, as *L. rhodopis* or some of the *Cystignathi*. The muzzle is rather elongate and the front rather convex. The limbs are rather long, and the tubercles on the inferior side of the digits are prominent. The terminal dilations of the toes are of moderate size, and equal on the two limbs.

The apex of the muzzle is narrowed, but rounded, and does not project much beyond the lip. Its distance from the nostril is one-third that between the latter and the orbit. The tympanic disc is very distinct, is sub-round, and its diameter is one-half that of the orbit. The tongue is pyriform and much narrowed in front. The nares are sublateral, and the *ostia pharyngea* very small. The end of the tarsus extends beyond the muzzle, and the heel marks the middle of the eye. Both tarsal tubercles are distinct. There are strong tubercles along the inferior face of each metatarsal. The skin is everywhere entirely smooth.

<i>Measurements.</i>	M.
Length of head and body.....	.0225
“ “ “ including tympana.....	.0075
Width “ “ at tympana.....	.0070

	M.
Length of fore limb.....	.0140
“ “ “ foot.....	.0050
“ “ hind limb.....	.0330
“ “ “ foot.....	.0155
“ “ tarsus.....	.0055
“ “ tibia.....	.0100

The color of the upper surfaces is a reddish brown; below, leather brown. The back is thickly spotted with large darker or blackish spots, the largest of which reaches to between the eyes. The sides are marbled with lighter and darker, but the femora are unicolor. Limbs obscurely cross-banded; below uniform, upper lip with a few pale spots.

Numerous specimens of this species were found by Francis Sumichrast at Potrero near Cordova, Vera Cruz, under decayed trunks of trees. It is of more lanciform proportions than the Central American species, *P. hyleformis* and *P. ringens*.

CYSTIGNATHUS LABIALIS Cope.

Vomerine teeth in transverse series behind the posterior border of the internal nares; toes without dermal border; no abdominal discoidal fold; posterior limbs short; end of metatarsus just reaching muzzle, muzzle short; not projecting; teeth much behind choanæ; one dermal fold on each side; skin rough; below white.

This small species belongs to that division of the genus, in which the toes do not possess dermal margin, and there is no discoidal fold of the abdominal integument. Among these it is distinguished by the shortness of the series of vomerine teeth and the paucity of dermal plicæ. The muzzle is acuminate and rather narrow, but not projecting as in *C. gracilis*; the canthus is not distinct. The tongue is oval and a little notched behind; the choanæ are small. The diameter of the tympanic disc is one-half that of the orbit. The heel only reaches the orbit. The toes are not very long; there are two small tarsal tubercles, and a narrow tarsal fold.

Color chocolate brown, the limbs darker cross-banded. A brilliant white band extends from the anterior part of the upper lip, and describing a curve upwards, bounds the orbit below and descends to the *canthus oris*, from which point it continues in a straight line to the humerus, and ceases. Inferior surfaces, pure white. Length of head and body, .020; of head, .007; of hind limb, .028; of hind foot, .013.

The precise *habitat* of this species is at present uncertain. It is probably a part of Sumichrast's Mexican collection.

SIPHONOPS PROXIMUS Cope.

Tentacular fossa close to eye; annuli complete; muzzle depressed, elongate, narrow; rings $\frac{0}{27} \frac{83}{33} - 19 = 129$ or $\frac{0}{25} \frac{74}{11} - 27 = 129$; longer than *S. mexicanus*.

This Caecilian resembles so much the *S. mexicanus* that I referred specimens of it to that species in my *Batrachia and Reptilia of Costa Rica*. It

possesses the same produced, flattened muzzle, with distinct eye, and the coloration is similar, but the position of the tentacular fossa is quite different, and the general form is more elongate and slender. The diameter is about the same. Length, .425; diameter, .017.

Coast of Eastern Costa Rica; W. M. Gabb.

SIPHONOPS SIMUS Cope.

Tentacular fossa close to eye; annuli complete; muzzle wide, truncate, nostrils terminal; annuli 228; anterior 8 undivided; 22 posterior fully divided by intermediate plicæ.

The form of the head of this species is different from that of any other *Siphonops* of Mexico or Central America, and its annuli are more numerous. They continue to the anus, and those of the principal series are nowhere divided on the middle line. The form is not slender, but is more so than in the *S. mexicanus*, resembling in this respect the *S. proximus*. Length, .308; diameter at middle, .011. Color dark brown; below a little paler.

This species was found in Costa Rica, the exact locality being uncertain. From Dr. von Franzius.

SIPHONOPS OLIGOZONUS Cope.

Tentacular fossa close to eye; many annuli incomplete; muzzle narrow, projecting; eye invisible; nostrils lateral; annuli of principal series 119, of which 14 anterior and 42 posterior are complete; of second series (none in anterior 72 annuli), 34 incomplete and 13 complete.

This Batrachian resembles at first sight the *Cæcilia ochrocephala*, as it possesses the same yellowish head and brown plumbeous body. It is abundantly distinct from the other species of the genus in various respects, combining the interrupted annuli of some of the Brazilian species, with a narrower, projecting muzzle, and invisible eye. The annuli continue to the vent, and those of the secondary series commence much posterior to the point of beginning in the other species. Length, 0.263; diameter, .005.

The precise *habitat* of this species is uncertain.

CAECILIA ISTHMICA Cope.

General form robust. Muzzle flat, rather wide, and projecting far beyond the mouth. Tentacular fossa near the edge of the lip a little behind and below the line of the nostril. Eye distinct. Annuli one hundred and forty-two, of which only the last sixteen surround the body, the anterior one hundred and twenty-six being interrupted both on the dorsal and abdominal lines. Between the last seven rings are additional plicæ, which cross the dorsal line and extend on the side, but are not continued across the abdominal line. Length, .570 mm.; diameter (which is about uniform), .020; length to rictus oris, .017. The general color in alcohol is dark brown; the inferior surface is a little paler.

This species was included in the collection made by Commander Selfridge

on the East side of the Isthmus of Darien. The species obtained are the following :

<i>Dipsas cenchoa</i> L.	<i>Ophibolus micropholis</i> Cope.
<i>Oxyrrhopus clevia</i> L.	<i>Nothopsis rugosus</i> Cope.
<i>Leptophis occidentalis</i> Gthr.	<i>Ninia atrata</i> Hallow.
<i>Herpetodyrus carinatus</i> L.	<i>Diploglossus monotropis</i> Kuhl.
<i>Rhadinæa ignita</i> Cope.	<i>Anolis laticeps</i> Berth.
<i>Pliocercus eurizonus</i> Cope.	<i>Cuercilia isthmica</i> Cope.

HELICOPS TRIVITTATUS Cope.

Scales in seventeen longitudinal rows, all keeled excepting the inferior two. The keels are moderately and equally developed throughout the entire length. The last maxillary tooth is not much longer than the others, and it is separated from the penultimate by a space which a little exceeds those between the anterior teeth. The internasal plate is nearly triangular, the rostral is wider than high, and the nasal is as long as wide, and is divided downwards from the uplooking nostril. Loreal twice as high as long; oculars 1-2, the anterior narrow, and well separated from the frontal. Two long large temporals on the external side of each parietal, the anterior occupying the space behind the postoculars. Superior labials eight, the eye resting on the fourth only; the fifth and sixth subequal, the seventh a little larger. Gastrosteges 121; urosteges 78; anal divided.

Color above dark brown, with an indistinct pale vitta on the fifth row of scales, and a yellow vitta on the adjacent halves of the first and second rows. Belly yellow with three longitudinal dark brown bands; the median only preserved on the tail.

Total length, .540; length of head to rictus, .015; of tail, .180.

Habitat unknown, but supposed to be the Argentine Confederation.

OXYRRHOPUS RUSTICUS Cope.

Head but little distinct from the body, front convex, muzzle slightly protuberant. Grooved tooth not much longer than those preceding it. Rostral plate as high as wide, convex and produced backwards above; internasals and prefrontals broader than long. Frontal with longer anterior than lateral borders, superciliaries narrow, parietals short. Nasals large, loreal longer than high, produced backwards to the orbit below the very small preocular, which is widely separated from the frontal. Postoculars two, in contact with one temporal. Temporals 2-3. Superior labials seven, eye resting on third and fourth; fifth higher than long. Eye rather small. Inferior labials nine, the fifth the longest, and in contact with the postgenial. Genials equal. Scales equal, rather wide, with double fossæ, and in nineteen rows. Tail short. Gastrosteges 223; urosteges 54; anal entire.

Dark yellowish brown above, the scales indistinctly blackish bordered; below uniform yellow; upper lip yellow.

This *Oxyrrhopus* is distinguished by a robust and obtuse form in a higher

degree than its nearest ally the *O. plumbeus*. The form of the rostral plate, peculiar relations of the loreal and preoculars, with the single temporal in contact with the postoculars, short tail, and color serve to distinguish it from that species.

From the same locality as the last. With them were collected the following species.

<i>Hyla rauterri</i> Bibr.	<i>Dryophylax olfersii</i> Licht.
<i>Aporophis anomalus</i> Gthr. (<i>L. rutilus</i> Cope).	<i>Ophcomorphus merremii</i> Neuw.
<i>Dryophylax schottii</i> Fitz.	<i>Thamnodynastes nattererii</i> Mik.
	<i>Herpetodryas carinatus</i> L.

CNEMIDOPHORUS MICROLEPIDOPUS Cope.

A species distinguished by the small size of the scales on the brachium and thigh.

A few rows of large scales on the collar; the edge with much smaller scales; two preoculars and a frenoöcular; three supraorbitals; larger gular scales few and in the centre of the throat; postbrachials numerous, small; brachials in 3, femorals in 14 rows; olive, with eight indistinct pale bands, black between the two inferior.

There are several flat small scuta behind the parietals and interparietals.

There are a few points of coloration to be observed in describing this lizard. There are four yellow spots at the corners of an imaginary square which encloses the tympanic disc. There is another between the antero-superior of these and the orbit, and another below the posterior part of the eye. The inferior yellow line is continued on the tail.

About the size of *C. scalineatus*; as the median dorsal lines are faint in the single specimen is not probably young.

West Tehuantepec, Sumichrast.

CNEMIDOPHORUS UNICOLOR Cope.

A small species distinguished by the absence of coloration marks.

A few rows of large scales on the collar; the edge with much smaller scales; two preoculars and a frenoöcular; three supraorbitals; larger gular scales few and in the centre of the throat; postbrachials larger, above point joining brachials which are in 5 rows; femorals in 10; olive brown with one pale lateral line; four pale spots below and behind eye.

There are four yellow spots round the tympanic membrane, one below the eye, and one between the latter and the nearest one of the former, as in *C. microlepidopus*. The dorsal scales are minutely roughened. It is in general characters allied to the *C. inornatus* Baird from Northern Mexico. The latter differs in the presence of four supraorbital plates, smaller collar scales, and coarser and rougher dorsal scales.

West Tehuantepec, Sumichrast.

CNEMIDOPHORUS IMMUTABILIS Cope.

This species attains to the largest size known in the genus, without losing its striped coloration, as do the other large forms.

Several rows of large scales on the collar, the border row not larger nor much smaller; two preoculars and a frenoöcular; larger gulars median, three supraorbitals; postbrachials small; brachials in 3, femorals in ten rows; adult with eight longitudinal bands; femora pale spotted.

The small size of the postbrachial and femoral scales, relate this species to the *C. guttatus*, but it lacks the small scales of the border of the fold seen in that lizard. The interparietal in an adult is narrow. The temporal region is covered with minute scales. There are numerous small scuta behind the parietals. There are two rows of antebrachial scuta well defined at the borders. Two rows between the inferior and infralabials. The inferior lateral brown band extends to the orbit. Throat pale; breast plumbeous.

West Tehuantepec, Sumichrast.

CNEMIDOPHORUS LINEATISSIMUS Cope

This swift lizard is of medium size in the genus, and maintains the lined coloration intact.

Several rows of large scales on the collar, the border row not larger nor much smaller; two preoculars; no frenoöcular; three supraorbitals; larger gulars extending across throat; superior preocular not descending to labials; postbrachials large, continuous with brachials; femorals in eight rows; black, with ten or eleven pale bands; sides and femora pale spotted; throat black.

The muzzle is rather acute but not elongate, and the fronto-nasals have considerable mutual contact. The larger and smaller gulars are abruptly distinguished from each other, and the former are smaller than the scales of the collar. The frenal plates form a circle surrounding a large median scute, of which the two posterior plates are the largest.

There is a space between the two submedian lines, which is often divided by a median line. Below the lowest line the sides are black with large light spots, open below.

Colima, Xantus; Guadalajara, Major.

CNEMIDOPHORUS LATIVITTIS Cope.

Several rows of large scales on the collar, the border row not larger nor much smaller; two preoculars, the superior not descending; no frenoöcular; supraorbitals 3; larger gulars extending across the throat; postbrachials large, continuous; femorals 8 rows; olive, with eight wide bands, ground black between second and third.

The nostril is in front of the nasofrenal suture. Parietals and interparietals of normal proportions, surrounded by a series of moderate scales, in a semicircle. One row between the inferior labials and infralabials. Brachials large, in five continuous rows, distinct, no postbrachials. Two rows of antebrachials. Scales of collar equal those of gular region, larger than postgulars, and smaller than abdominals. Femoral pores seventeen.

Color below bluish; pectoral region blackish; there are small yellow

spots on the external abdominal scuta and on the femora. A longitudinal yellow line on the posterior face of the femora.

Total length, M. 0.255; length to tympanic drum posteriorly, .020; to vent, .076; length of hind limb, .051; of hind foot, .026.

Tuchitan, Tehuantepec, Sumichrast.

This handsome species is, in the number of its longitudinal stripes, similar to the *C. octolineatus* of Baird. That lizard differs in having four supra-orbital plates, and smaller collar scales; the stripes are also much narrower.

CNEMIDOPHORUS COMMUNIS Cope.

This species is near to the *C. sexlineatus* in its characters, but constantly differs in the presence of the frenoöbital plate. It is also much larger, the males equaling the large *Amivas*.

A few rows of large scales on the collar, of which the marginal is the largest; two preoculars and a frenoöcular; four supraorbitals; large gulars extending across throat; postbrachials and brachials large, continuous; three large preanals; femorals in 8-9 rows; olive, with six light bands with light spots in the intervals, the former breaking into spots in the adult male.

There are two varieties of this lizard. In the first, there are rows of light spots in the spaces between the stripes in the females; while in the males the stripes are broken up into round spots so as to give a coloration like that of the *C. guttatus*. In the second variety there are no spots and the bands are unbroken. The specimens resemble the young of var. 1.

Var. I. Colima, Xantus; Coban, Guatemala, Hague.

Var. II. Guadalajara, Major; Cordova, Sumichrast; Guatemala, Hague; San Antonio, Texas.

CNEMIDOPHORUS ANGUSTICEPS Cope.

This species is in general characters similar to the last, but it differs in the coloration, and in the very narrow form of the parietal and interparietal plates.

A few rows of large scales on the collar, of which the marginal is the largest; two preoculars and a frenoöcular; four supraorbitals; similar but interparietal and parietal scuta half as wide; ground color black and bands much wider and not broken up in male.

The color stripes of this species if assumed to be those of the paler color, are much wider than the ground, and instead of becoming broken up as in *C. communis*, send off lateral processes, which give the dark ground color a very broken character. The color of the bands is an olive green. The adult male is of about the size of those of *C. communis* and *C. guttatus*.

Yucatan, Schott.

CNEMIDOPHORUS COSTATUS Cope.

In general characters this lizard resembles the last two, but it differs in the shorter head, and strikingly in the coloration.

A few rows of large scales on the collar, of which the marginal is the largest; two preoculars and a frenoöcular; four supraorbitals; similar to *C. communis*, but head shorter and scuta wider; brown with black cross-bands on sides, which join across the middle line on the lumbar region; sacral region and femora white spotted.

The short head of this species is accompanied by an abbreviation of the sutures of mutual contact of the fronto nasal and internasal pairs of scuta, which is not seen in the other allied species. The unique specimen is smaller than the females of the two species last described, yet it presents no trace of stripes. From its coloration I should suppose it to be an adult male.

The locality of this specimen is only stated to be "Mexico."

GERRHONOTIDÆ.

The important variations in the scutellation of the head of the species of this family lead to the view that several genera are indicated. The definitions of these are as clear as those of many genera of the system, and as it appears to me, may be profitably associated with names as elsewhere. There is a tendency to subdivision of the head-shields in some species, it is true, but a little patience in studying the homologies of the portions separated in excess, will refer them to their proper positions and reduce them to the types herein mentioned. Dr. Gray, in 1845, attempted to distinguish four genera among the species of the original genus *Gerrhonotus* of Wiegmann, but the characters he seized upon do not, with one exception, possess the importance he attached to them. The exception is that of *Barissia*, which has maintained its distinctive feature, the absence of the interfrontonasal scutum. Two species recently described by Bocourt exhibit, according to that herpetologist, the equally important feature of the absence of the frontonasal plates. The great subdivision of the plates of the internasal region distinguishes a number of species, one of which was named long since *Pterogasterus* by Messrs. Peale and Green.

PTEROGASTERUS Peale and Green.

Three pairs of internasal scuta: interfrontonasals and frontonasals present.

Species: *P. ventralis* P. & G.; *P. tessellatus* Wiegmann; *P. ophiurus* Cope; *P. infernalis* B. & G.; *P. lemniscatus* Boc.; *P. modestus* Cope, sp. nov.

GERRHONOTUS Wiegmann.

Two pairs of internasals; interfrontonasals and frontonasals present.

Species: *G. multicarinatus* Blv.; *G. grandis* B. & G.; *G. scincicaudus* Skilt.; *G. principis* B. & G.; *G. kingii* Gray; *G. gramineus* Cope; *G. auritus* Cope; *G. taniatus* Wiegmann; *G. deppei* Wiegmann; *G. formosus* Bd.; *G. vasconcelosii* Boc.; *G. rhombifer* Pet.; *G. monticolus* Cope, sp. nov.

MESASPIS Cope, gen. nov.

Two pairs of internasals; interfrontonasal present; frontonasals wanting.

Species: *M. moreletii* Boc.; *M. fulvus* Boc.

BARISSIA Gray.

Two pairs of internasals; interfrontonasals wanting; frontonasals present.

Species: *B. antauges* Cope; *B. bocourtii* Pet.; *B. lichenigera* Wiegman; *B. imbricata* Wiegman; *B. rudicollis* Wiegman.

An extinct genus of the family has been found in the Miocene beds of the White River group of Colorado, which I have called *Peltosaurus*.* The scales in that genus were conjoined by sutural borders and not imbricate, as in the recent genera.

PTEROGASTERUS MODESTUS, sp. nov.

Scales $\frac{1}{2}$ slightly convex above, but not keeled, excepting those of the tail, which are strongly and obtusely carinate or ribbed; an azygos scute between the two anterior pairs of internasals. Internasals of first pair reaching first labials. Internasals of third pair elongate, in contact with frontonasals behind, apparently including the small lateral interfrontonasals. Two postnasals; a large plate, the anterior canthal, descends to the labials, from the inferior part of which a loreal may be separated. Preoculars two or one. Two pairs of large infralabials in contact, following the symphyseal, without a postmental; two pairs follow, of which the anterior are separated by one scute. Lateral fold extending from ear to vent; the granular area extending above the humerus. Appressed limbs separated by six cross-rows of abdominal scales, or the length of the fore arm. Rows of scales from nape to origin of tail, forty-seven; do. from front of humerus to vent, thirty-eight.

The tail is not very long and is grooved below as well as above. Total length, .150; length to meatus auditorius, .012; to vent, .072; length of hind leg, .019. Color above, brown; below, olivaceous. The sides are a reddish-brown or maroon, bordered above by a blackish line which separates it from the dorsal color.

This species differs from all others of the genus in the extinction of the small plate which truncates the lateral angle of the interfrontonasal. As a consequence of this, the latter has a diamond shape, as it does not reach the frontal plate behind nor the azygos plate in front. The smooth scales also separate it from all others of the genus.

The precise locality from which the specimens of this lizard were sent to the Smithsonian Institution is uncertain, but is probably Guatemala.

GERRHONOTUS MONTICOLUS, sp. nov.

"*Gerrhonotus fulvus* Boc," Cope, Journ. Ac. Phila., 1865, p. 118, nec Bocourtii.

Scales keeled on the middle line of the back, to the number of three or four rows; other dorsal and lateral series smooth; those of the superior surface of the tail keeled strongly. Lateral fold extending from ear to vent; granular scales extending above the humerus. Scales above and

* Annual Report U. S. Geol. Surv. Terrs., 1873, p. 512.

below $\frac{1}{2}$; forty-five transverse rows between nape and origin of tail, and thirty-six rows between front of humerus and vent.

The interfrontonasal is transversely diamond-shaped, and has no external plates at its lateral margins. The frontonasals have considerable mutual contact. There are two postnasals; the anterior (and only) canthal descends to the labials, taking the place of the loreal, and there is one large preocular. A postmental follows the symphyseal, and then one pair of infralabials in contact. Two pairs follow, the anterior interrupted by one, the second by two, scales. The auricular opening is nearly as long as the fissure of the eye. The appressed limbs are separated by the space of four ventral cross-rows, or the length of the longest digit of the manus. The tail is of moderate length.

Color of upper surface and sides, brown, the latter a little darker, and bounded above by a narrow black line. A somewhat irregular row of small black spots down the median dorsal line. Below yellowish olive, the scales of the abdomen with black borders, those of the gular and thoracic regions with black centres.

Total length, M. .143; length to auricular meatus, .012; to axilla, .023; to vent, .061.

From the summit of the Pico Blanco (elevation 11,500 feet) in the Eastern Cordillera of Costa Rica; W. M. Gabb.

This species I provisionally identified with the *G. fulvus* of Bocourt, which has been found in Guatemala. The two species are probably nearly allied, but present a difference in the cephalic scutellation, which is of generic value.

Further Illustrations of Central Force.

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(Read before the American Philosophical Society, July 20th, 1877.)

The establishment of centres of oscillation and harmonic nodes, in an elastic medium, is a necessary consequence of the principle that "a system of bodies in motion must be regarded mechanically as a system of forces or powers which is a perfect representation of all the single powers of which the system is compounded, and this, too, at whatever time or times the component powers may have been introduced into the system." *

But since it is often more difficult to grasp truths which are presented under new aspects, than those which are clothed in familiar garbs, it may be well to glance at some of the most obvious tendencies to nodal action, which result from simple gravitating fall towards a centre. The exami-

* Peirce. Proc. A. A. S., ii, 111.